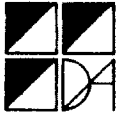


EXHIBIT 44



Dormitory Authority -- State of New York

Memorandum

TO: Steve Boiko

FROM: Chuck Bartlett

DATE: November 5, 2003

RE: Terrazzo Flooring System Failure Baruch College Site B

I have reviewed the correspondence you provided regarding the failure of the flooring system at the Baruch College Library in follow-up to our recent meeting. The June 17, 2003 correspondence from TDX summarizes four investigative reports regarding the flooring system failure and provides background information relevant to the flooring system installation. Review of the TDX correspondence and the reports on which it is based suggest that the causes of the failure of the flooring system have been adequately identified. Details of my review are as follows:

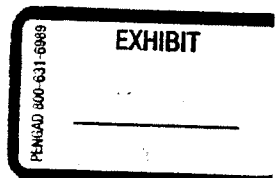
Investigative Efforts

Four investigations regarding the failure of the flooring system have taken place to date. Reports associated with these investigations were included with the TDX correspondence and include the following.

- "Preliminary Investigation Report" prepared by Testwell Laboratories dated March 5, 2003 for TDX;
- "Petrographic Investigation of Terrazzo Flooring System Cores, Baruch College -- Site B, New York, New York", April 15, 2003 by Testwell for TDX;
- "On-Site Inspection of Epoxy Terrazzo Installation at Baruch College", April 17, 2003 prepared by the National Terrazzo & Mosaic Association, Inc ("NTMA") for TDX; and,
- "Terazzo Inspection Report" prepared by Niagara Research Associates for GM Crocetti, Inc, ("Crocetti"), the flooring contractor. While this report is undated, Crocetti forward this report to TDX on April 8, 2003.

Each investigation noted the failure of the bond between the terrazzo flooring system and substrate. Development of rough surface or "alligatoring" on the surface of the terrazzo was also noted, however for the most part, none of the investigations cited this as being associated with the failure of the terrazzo to bond. Each report tended to associate this problem with improper floor maintenance

The conclusion section from each of the Testwell reports as well as the NTMA and Niagara reports in their entirety are attached with this memorandum.



Causes of Flooring System Failure

1) Use of an inappropriate leveling compound, and improper installation

Separations of the self-leveling material from the underlying concrete, from the terrazzo and from itself were all noted. Excessive water content during placement was cited as a cause of the failure (see attached Testwell April 15th conclusions). Additionally, this material (Conflow Self Finishing and Leveling Composition) was not approved by the terrazzo manufacturer (see attached letter). The NTMA and Niagara consultants (see attached reports) also cited failure of the self-leveling material and questioned its use in this application. Additionally, based on review of manufacturers literature the material may have been placed in thicknesses (1 ½") greater than the allowable maximum (1") for this material.

2) In some areas, residue from curing compounds apparently prevented the terrazzo system and self-leveling material from properly adhering to the concrete substrate.

Testwell's March 5th and April 15th reports note the presence of residues beneath the epoxy membrane (the epoxy membrane is the first or bottom most layer of the terrazzo system) in areas where the terrazzo was applied directly over the underlying concrete. Specifically, Testwell's analysis of the residue indicated the presence of styrene acrylate, a common ingredient in concrete sealant (see Testwell April 15th conclusions). Testwell's visual inspection of samples collected in areas where the self-leveling compound was used suggests that curing compound may have been applied in these areas as well.

In fact, the MSDS (attached) for the concrete curing compound specified for this project (see attached specifications), Euclid "Super Diamond Clear" lists styrene ethyl hexyl acrylate copolymer as an ingredient. The manufacturer of the self-leveling material (Conflow) indicates that this compound is not an ingredient of that material or its associated primer. Therefore based on the information in hand it seems reasonable to assume that the styrene acrylate is associated only with the curing compound.

In no case however, should curing compound have been present in these areas:

- The concrete specifications (attached) indicate that the curing compound "should be used for all slabs to remain exposed, or to receive mastic adhesive for floor finish". Thus, the curing compound should not have been applied in areas to receive terrazzo".

- The manufacturers literature for the floor leveling compound (attached) state that the "Floor should be free of oils, waxes, curing compounds, sealers and any foreign material". The manufacturers literature also indicates that floors should be cleaned " with a mechanical scrubber with a vacuum pickup or shot blasting equipment to remove dust and dirt" prior to installation of the self-leveling maerial.
- The specification for the terrazzo flooring system (attached) under "Slab Preparation" states that the contractor is to "vacuum blast slab to completely remove curing compounds and other substances that would interfere with proper bond of epoxy terrazzo". Thus, any curing compound present should have been removed prior to application of the terrazzo finish.
- The manufacturer's literature for the epoxy membrane indicates the following under "substrate suitability and preparation", "No curing agents which could prevent bonding should be used".

The TDX correspondence indicates that:

"Trataros was required to remove all curing compounds and other substances that would interfere with the proper bonding of the epoxy terrazzo. Trataros' subcontractor s, Bartec and Crocetti sanded the concrete floors prior to installation of the epoxy floor or flash patching of the concrete floor to meet the leveling criteria established by the Architect".

This language and the presence of the curing compound residue suggest the floors either were not vacuum blasted at all or that vacuum blasting was performed in a manner that was insufficient to remove the curing compounds that had been applied (apparently in error) to these areas.

3) Failure of the concrete surface itself;

Testwell's (April 15th report) indicated that in one sample the surface of the concrete itself was delaminating. Testwell ascribes this failure to over finishing the concrete.

4) Other Factors

Other factors such as solvent odors beneath the terrazzo were noted in the four reports; however most of these concerns are based on hearsay or do not appear to be credible (cleaning chemicals).

Responsibility

It appears that the designer (Kohn Pedersen and Fox Associates, ("KPF")), the construction contractor (Trataros) and the contractor responsible for the concrete (Shroid) all bear some responsibility for the failure of the terrazzo system. In my opinion however Trataros through their subcontractors is most responsible.

Kohn Pedersen and Fox

The need for floor leveling

Based on information submitted by TDX, it appears that the structural system for the building floors was designed by KPF to have a crown at installation that would subsequently be leveled by the weight of the overlying slab and flooring system.

After installation however, it was found that the crown had not leveled and the floors did not meet the tolerance required for the installation of the terrazzo flooring system. During construction, the prime contractor responsible for the concrete floor slabs (Shroid) noted the excessive crown and submitted RFIs on four occasions asking for direction. In each case, KPF directed that "slab thickness shall be maintained as called for on the drawings in lieu of maintaining floor elevation". Thus KPF's initial defective design and subsequent direction led to the construction of floors that were not sufficiently level for installation of the terrazzo flooring system. A floor-leveling compound was then required.

Approval of inappropriate floor leveling compound.

Upon being directed to proceed with leveling the floors Trataros submitted manufacturer's information for the proposed floor leveling system to TDX for submission to KPF for approval. KPF approved this submittal on April 13, 2000. Based on the investigations and information received from the Terrazzo system supplier (TEC specialty Products, attached) it appears that the floor-leveling material used (Conflow) was not appropriate for use with the specified terrazzo flooring system.

Trataros

Defective floor-leveling compound application

Based on the Testwell's report it appears that the floor leveling material was improperly mixed (by Trataros' subcontractor Bartec) and contained too much water. This in turn led to failure of the floor-leveling material system and in all likelihood

prevented the terrazzo system from adhering properly. The Niagara report (prepared for Crocetti, attached) indicates that Crocetti (Trataros Subcontractor) proposed alternate floor leveling material however TDX disputes this allegation.

Failure to properly clean /prepare the concrete surface prior to installation of floor leveling compound and the terrazzo flooring system.

Both the terrazzo and the self-leveling material have been noted to be separating from the underling concrete.

In areas where floor-leveling compound was not required, Trataros's subcontractor (Crocetti) failed to adequately remove the curing compound from the concrete prior to applying the terrazzo flooring system as called for in the specification (attached). This is supported by the presence of curing compound components in the residue beneath the terrazzo flooring. This likely prevented the terrazzo flooring system from bonding properly to the concrete.

Trataros subcontractor Bartec was responsible for application of the floor leveling compound (Conflow) under a change order to the original contract. As noted previously, the manufacturer's literature indicated that the "Floor should be free of oils, waxes, curing compound, sealers, and any foreign material" and should have been vacuum blasted prior to application of the self leveling compound. As noted previously Testwell's investigation suggests the presence of curing compound below the floor leveling material.

TDX indicated that Bartec and Crocetti sanded the floors prior to installation of the terrazzo and self-leveling compound. This information and the presence of the curing compound residue suggests that the concrete surfaces either were not vacuum blasted at all or that vacuum blasting was performed in a manner that was not sufficient to remove the curing compounds that had been applied (apparently in error) to these areas.

Lastly, the specifications for the terrazzo (attached) state, "Starting on the work shall imply acceptance of the surface conditions to perform the work as specified.". So, by virtue of starting the work Crocetti accepted the surfaces to which the terrazzo was to be applied.

Shroid

Failure to comply with the specification regarding application of curing compounds in areas designated for terrazzo flooring.

The concrete specifications indicate that curing compound should not have been utilized in areas designated to receive terrazzo flooring. Chemical analysis of residue found below samples taken from areas where terrazzo was placed directly over concrete suggests that curing compounds were applied in these areas. Visual inspection of samples of the floor-leveling compound suggests the presence of curing agents in these areas as well, which may be a factor in the failure of the leveling material to bond to the concrete. The manufacturers literature for the floor leveling material (attached) indicates, "Floors should be free of oils, waxes, curing compounds, sealers and any foreign material."

In some areas the surface of the concrete itself appears to be delaminating

Based on Testwell's analysis it appears that the surface of the concrete itself is delaminating due to overworking during installation.

Next Steps

Following review of this memo, I recommend that representatives of Cost Control, Project Management and Counsel's Office meet with Testwell and the NTMA to review their findings. If Testwell and the NTMA support the interpretation of the findings in this memo it may be advisable to forward the subject reports to Traveler's Insurance (Trataros's bonding company) and KPF as a preliminary step towards negotiating an appropriate settlement.

attachments

c: Doug Van Vleck
Rick Bianchi
Michael Kolk
Jay Goldstein
Karen Graber
Jack Kemp
John Mueller

**Conclusions from "Preliminary Investigation Report" prepared by Testwell
Laboratories**

TESTWELL LABORATORIES, INC.

TDX Construction Corporation; Baruch College - Site B
 Lab #: NBX-004AA; Report #: ML-01/NBX-004
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4. PRELIMINARY CONCLUSIONS

The scale of the failure is confined to within terrazzo segments and exhibits no coherent relationship to underlying structural units. Therefore, it is believed that the cause of the problem is limited to the flooring application and not larger scale movements or failures of the underlying structural slab. The morphology of the failure tends to be defined by a convex curling and an ovate pattern of debonding. This is consistent with deformation related to material shrinkage and this shrinkage is believed to be the primary stress leading to the debonding. However, shrinkage is supposed to be accommodated by failure along the zinc joints and it should be stressed that no suggestion is being made here that shrinkage was necessarily excessive. The debonding occurs strictly between the epoxy membrane and the substrate regardless of whether the substrate is lightweight concrete or self-leveling compound. Furthermore, the debonding is usually complete with no residual epoxy membrane adherent to the substrate even where scarified. Clearly, the epoxy-substrate bond is the weakest in the system. This weak bond appears to be exploited by the natural material shrinkage.

There appears to be some evidence of residues below the epoxy membrane and this is an area for further investigation. Incomplete cleaning of the substrate may be responsible for a weak epoxy bond. This seems likely particularly where the concrete slab is scarified and the membrane has not even adhered to the rough grooves of the preparation. In terms of materials, there does not appear to be any deviations from the manufacturer's recommendations. It may be more difficult to determine whether or not a curing agent had been applied to the concrete.

The "alligator texture" may be related to shrinkage as the epoxy matrix is in lower relief relative to the aggregate. However, the distribution pattern is not very ordered and it may be difficult to relate this texture to shrinkage of the product.

This investigation was followed by a second investigation involving petrographic analysis of terrazzo samples, underlayment samples, and concrete samples. That investigation was performed in follow-up to Testwell's recommendation.

Conclusions from the second Testwell investigation are included in the next section.

- CKB

**Conclusions from Testwell April 15, 2003 "Petrographic Investigation of Terrazzo
Flooring System Cores, Baruch College – Site B, New York, New York"**

TESTWELL LABORATORIES, INC.

TDX Construction Corporation; Baruch College - Site B
 Lab #: NBX-004AA; Report #: ML-04/NBX-004
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8. CONCLUSIONS

"Alligator Texture"

The cause of the "alligator texture" is not positively identified in this study. Evidence seems to be contradictory. In the single core representative of the condition recovered for petrographic examination there would seem to be some indication of an inherent material failure. The deformation of the surface correlates strongly with tensile cracks intersecting the surface of the terrazzo. However, most "alligatoring" observed in the field is not accompanied by surface penetrating cracks. No information is available to indicate whether or not all the "alligatoring" is related to subsurface cracking. There could be a correlation between the occurrence of "alligatoring" and settlement of some fine aggregate within the terrazzo layer.

It is felt that the macroscopic distribution of the texture is more telling with respect to the responsible process. Most "alligatoring" occurs at terrazzo field edges adjacent to zinc strips. In other cases, the texture swirls out into the terrazzo field in circular arcs. Finally, there does not appear to be a coherent pattern of areas displaying the texture. If the failure derived from an inherent property of the material, it would be expected that "alligatoring" would consistently appear throughout zones poured from a single mix. The pattern itself is more suggestive of something created by a rotary device such as a buffing machine and it is possible that the maintenance of the flooring may be responsible.

In the vast majority of cases, the texture is characterized by a deformation of the binder with the aggregate remaining unaffected. This rules out the influence of acidic solutions as the aggregate is acid soluble and would be etched by something like a muriatic solution. As the binder is 100% epoxy based it would be expected that an organic solution would have more effect. Questions related to compatibility of cleaning solutions are better addressed to the terrazzo manufacturer as they would be more familiar with the sensitivity to various chemicals of their proprietary formulation.

Finally, it is notable that there is no correlation between the occurrence of "alligator texture" and areas where debonding is experienced. There is no evidence to suggest that these processes are in any way related.

Terrazzo system

The scope of this study does not include an analysis of the aesthetic properties or finishing tolerances of the terrazzo placement. However, with the exception of observations described above, no obvious deficiencies are noted within the terrazzo system at any of the probe locations or core samples. The terrazzo system comprises the epoxy binder and aggregate mixture, epoxy membrane, zinc strips, and zinc adhesive. With the exception of designed vertical separation between the terrazzo and the zinc strips, no debonding failures are noted within the system. It is understood that questions have been raised with respect to corrosion or other chemical deterioration of the zinc strips. No such corrosion is detected in this examination.

At the time of the initial field investigation the fact that the material comprising the terrazzo binder is a 100% solids epoxy was neglected. It is agreed that such a formulation should be free from shrinkage. However, some questions remain regarding the observed curling of the terrazzo segments and we maintain that this deformation is at least consistent with some component of

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shrinkage (albeit minor). The terrazzo system can be modeled by a thin two-dimensional rectangular element restrained in compression at the vertical ends by the zinc strips, restrained in shear by the underlying horizontal substrate, and unrestrained at the upper horizontal free surface. Shrinkage in such a model would produce a tension at the vertical strips, shear restraint at the lower surface, and unrestrained horizontal contraction at the upper surface. Eventual failure along the lower shear surface would result in a typical curling pattern and a negative ovate pattern of debonding as is observed in three dimensions at probe location 2W. In contrast, expansion should produce an inverse pattern. The vertical surfaces would experience compression and the free surfaces would experience an unrestrained expansion. The resultant deformation is expected to be a doming with greatest deflection at the center of the element. Therefore, it is not believed that an expansive deformation is responsible for the observed pattern of deflection. No clear mechanism responsible for shrinkage is detected in this study whether related to initial placement or subsequent maintenance. However, it is still believed that some small component of shrinkage is needed to explain the observed deflections of the terrazzo system.

Self-leveling Material

While the compatibility of Conflow with the epoxy membrane may be a compounding factor with respect to debonding, it is felt that more significant problems exist within the self-leveling system. Self-leveling compounds are designed to use a minimal quantity of water for hydration purposes and most of the flowability is due to the inclusion of various plasticizers. When a small excess of water is added, bleeding problems may occur sometimes resulting in a laitance (a thin layer of "wetter" material with lower strength). With still greater water addition, segregation of components may occur. Strength reduction and shrinkage is even greater in this case.

None of the examined Conflow lifts studied for this report exhibit a homogeneous texture. Most display a smooth "fining upwards" sequence of segregated materials with fine aggregate settled at the bottom of the lift. In some cases, no aggregate is detected at all. However, core #3 exhibits a thin taper of sand within a single lift that disappears midway through the core section. This is interpreted to reflect lateral flow of the segregated material during placement with finer hydrates and matrix riding over the fine aggregate and continuing to flow further than the coarser material. This process would explain the lack of sand witnessed in other probes. In core #3, a thin efflorescence is detected at the top of the Conflow lifts which is interpreted to result from precipitation of calcium mineral phases from bleed water at the surface of the fresh lift. A slightly greater thickness below the efflorescence is characterized by a very soft, light-colored, unsanded laitance. It is felt that this is comparable to the "relatively soft surface" described by Mr. Iselin on page 3 of his report.

Two types of crack structure are detected within the Conflow. The first is a polygonal hairline shrinkage structure that is essentially vertical. Shrinkage cracking may also be explained by excessive mix water. The cracks are interpreted to predate any debonding observed within Conflow lifts. Along the debonded surfaces within sample #12 a plumose structure is detected. Plumose structure is defined by very finely spaced en echelon tensile cracks that join to form a single tension crack. This structure likely reflects the actual debonding event responding to an essentially vertical tensile stress acting across the Conflow lift. Initially it was believed that this debonding represented the contact between a thick primer and the Conflow lift. However, there appears to be a smooth gradation of material rather than an abrupt contact when the material is viewed under low magnification. Thin sections for this sample were not within the scope of this project. However, core #3 exhibits a similar material at the tops of the Conflow lifts (albeit thinner) and these are observed to reflect continuous and gradationally segregated Conflow. It is interpreted here that the Conflow

2/4

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TDX Construction Corporation; Baruch College - Site B
 Lab #: NBX-004AA; Report #: ML-04/NBX-004
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debondings are occurring within the laitance described above due to the reduced strength of the segregated material.

Overall, it appears that the Conflow laitance defines the weakest bond within the flooring system particularly when the laitance is on the order of a millimeter or so. When an efflorescence is present above this laitance, the weakness may be present at the uppermost surface of the lift. It is likely that a large percentage of the service failures are related to weaknesses present in the self-leveling treatment. These weaknesses are interpreted to be the result of an excess of water added to the mixture during placement. However, samples B1 and 2E may contain an additional weakness. In particular, probe location B1 exhibited a clear debonding surface within the laitance still present after sampling but the uppermost debonding occurred just below the epoxy membrane which had a "sticky" residue adhered to the failed surface. This residue is superficially similar to that detected along the ground floor probes. This residue is discussed below.

Concrete

The debonding condition is widespread throughout the building and the total sampling exposure is relatively small. Without more confident information it is difficult to say that debonding tends not to occur between terrazzo and concrete substrate. In fact, two of the seven original probes expose failure between scarified concrete and epoxy membrane.

→ *Appears to be a component of the specified curing compound. See attached MSDS*
One possibility considered involves residues observed beneath the epoxy membrane at locations 1G and 1N. The residue was analyzed by FTIR-ATR (TLI Lab #: NBX-004AA; Report #: ML-02) and styrene acrylate was detected. This compound is a common ingredient in concrete sealants. All core samples recovered for this study contain a thin dark layer at the structural concrete surfaces consistent with the application of a penetrative sealant. Debondings present at probes B1 and 2E between epoxy membrane and Conflow display a superficially similar appearing residue. While no chemical analysis has been performed on these other samples, it appears that a penetrative sealant may have been applied to many surfaces within the application. It is not known to what extent such a sealant (if present) is compatible with the flexible epoxy membrane. Once again, questions related to specific material compatibility should be directly addressed to the manufacturer.

→ *It's not! see mfg. literature (attached)*
 Core #1 reflects the only sample fully recovering the occurrence of terrazzo directly overlying structural concrete. While no debonding is detected along the entire corridor from which this sample was recovered, it is notable that a concrete delamination is present within the core sample. The delamination occurs cleanly between the main body of air-entrained normal weight concrete and a veneer of mortar from which the air-entrainment has been worked out during the finishing process. This structure is very typical of overfinishing of concrete during placement and often results in scaling or delamination. No scarification was detected in the core sample. However, scarification of the concrete at probes 1G and 1N was performed at a location within tens of feet of the core #1 location. Admittedly speculative, it may be possible that a similar overfinishing is present at these probes and the scarification penetrated an incipient delamination. The scarification would thereby expose an inherent weakness in the concrete leading to a debonding condition. If an incompatible sealant were also present, the combination of unbonded mortar and poorly bonded epoxy membrane could easily lead to a debonding failure.

The only remaining debonding involving concrete is located at probe #12. Here, the lower lift of unsanded Conflow has cleanly separated from the underlying concrete substrate. In fact, the separation continues cleanly across the concrete control joint without any adherence of Conflow.

Continued Next Page

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Here it is believed that issues related to the Conflow mixture (discussed above) are responsible for the debonding

Comments on Repairs

Based on the data provided by this report it cannot be confidently stated that the observed failure will not continue to worsen. Clearly there are potential weaknesses within the application not the least of which may reside below the base of the terrazzo system. The contacts between multiple lifts of Conflow may be the most questionable. In a high traffic area, horizontal weaknesses may be exacerbated even if "settlement stresses" related to initial differential volume changes have ceased to be a considerable factor. It is beyond the scope of this project to suggest possible reparations and Testwell Laboratories, Inc. does not assume responsibility for the success or failure of any attempts to salvage the existing flooring system nor does it favor any particular solution. However, the author simply stresses the need to carefully assess the results of any such attempts. Only one well exposed attempt at an epoxy injection repair was observed at probe #12. It is clear that the failure of this repair had nothing to do with the inability of the terrazzo system to "rebond" with the Conflow substrate. In fact, the injection repair completely bypassed the terrazzo debonding and penetrated the separation between the lowest lift of Conflow and the structural concrete substrate. The structure exposed by the probe suggests that this repair actually tightly "rebonded" these two layers together. The greatest difficulty inherent in this method is the identification of multiple debondings that may be present in the subsurface. It is suggested that data provided by these studies be assessed by a party experienced in such repairs in order to determine whether or not a more "non-destructive" repair may be viable.

TESTWELL LABORATORIES, INC.



John J. Walsh, M.A.
Petrographer



Kaspal R. Thumma, Eng. Sc. D. P.E.
Vice President
Kit/ljw

Samples will be discarded after three months unless otherwise instructed. This report is the confidential property of the client and any unauthorized reproduction is strictly prohibited. The interpretations and conclusions presented in this report are based on the samples provided.

A/A

**April 17, 2003 On-Site Inspection of Epoxy Terrazzo Installation at Baruch College”,
prepared by the National Terrazzo & Mosaic Association, Inc (“NTMA”)**

April 17, 2003

**NTMA On-Site Inspection of
Epoxy Terrazzo Installation at
Baruch College
55 Lexington Avenue
New York, NY 10010**

At the request of the NTMA (subsequent to request from TDX Construction Corporation) I flew to New York on Wednesday April 9, 2003 to view the above Terrazzo installation and meet with Mr. Tom Spinthourakis of TDX and others. Prior to my arrival in New York, Mr. Spinthourakis had forwarded to me copies of a "basic information package concerning the uplifting Terrazzo at Baruch College", i.e. specifications, Testwell Laboratory reports, MSDS, etc.

I arrived at the site approximately 11:30AM and did a very quick walk-thru of the street level prior to meeting with the following individuals at approximately 12:00 Noon.

THOSE IN ATTENDANCE:

Mr. Tom Spinthourakis w/ TDX

Mr. Daniel G. Kaufmann – Assistant Vice President / Campus Facilities and Operations – Baruch College

Mr. Peter Cavassa – Operations Coordinator Campus Facilities and Operations – Baruch College

Mr. Steve Wu – Project Manager Campus Facilities and Operations – Baruch College

Mr. Thomas Schmidt – Chief Engineer Buildings and Grounds – Baruch College

Mr. Ken Sanden – Project Manager The City University of New York (CUNY)

Mr. Richard Gardner – Terrazzo Supervisor – GM Crocetti, Inc.

Mr. Gary Markus – GM Crocetti, Inc.

THE PROBLEM:

The NTMA was asked to address the "Request for On-Site Inspection" provided to the NTMA dated 3/14/03 which stated "*The Epoxy membrane is separating from the substrate, specifically at the perimeter zinc strips. The center of the 2'x4' Terrazzo panels seem to be retaining their full adhesion. In addition there seems to be something causing an epoxy shrinkage giving the surface an alligator/bumpy finish!*"

PRE INSPECTION MEETING:

At the beginning of this meeting I explained my reasons for being there on that day and the NTMA's role in the Terrazzo industry, i.e. dissemination of information, education, etc. and explained that I was there to determine adherence to NTMA Guidelines. Further, I explained my qualifications as an inspector.

At this time I allowed others to present the facts as they saw them, viewed numerous samples removed from the floor, followed by an interview (in front of all present) with GM Crocetti, Inc. to provide me with a step by step dissemination of their Terrazzo installation methods.

INSPECTION:

As a group starting at the 14th floor, we walked each floor down to the Street level and several floors below street level. For the most part the adhesion problem appeared to be most pronounced on floors 13 down through the street level. The alligator/bumpy finish was much less pronounced on these floors (but present to some degree) with the exception of the 1st & 2nd level elevator lobbies, which appeared to have the most alligator/bumpy finish present in the lighter colored Terrazzo directly in front of the elevator cabs.

EVALUATION:

The Terrazzo finish is completed in a manner which would generally meet NTMA Guidelines. The "alligator/bumpy" finish, as agreed by all parties, has appeared post job completion.

The Terrazzo exhibits density of aggregate and matrix which would generally meet NTMA Guidelines.

The Terrazzo appears to be fully bonded to the membrane in all visible cases.

The membrane is not fully bonded to the underlayment in many instances.

The underlayment does not appear to be of a type that would meet NTMA requirements.

The underlayment has flaked/cracked in many instances, and exhibits immediate deterioration in the presence of moisture.

OPINION:

The failure of the bond between the membrane and the underlayment is caused by the use of an underlayment which is deteriorating, and is of a type that I believe would not meet NTMA Guidelines. The failure may have been further aggravated by deflection caused by loading of the "Post Tension" concrete, and additional areas of loose floor may be the result of the use of a concrete/curing hardener which was not completely removed from

the concrete prior to membrane installation (in fact the NTMA recommends that where epoxy Terrazzo is to be installed "curing compounds of any type are not to be used"). The "alligator/bumpy" finish seems to appear more in areas which we would assume get more maintenance, and the maintenance materials we were given MSDS's for and viewed in the storage areas contain Diethylene glycol methyl ether, which is a solvent and could cause deterioration of the Terrazzo finish. In fact, I observed one floor area where there were visible indentation lines of a 1 gallon bucket present in the Terrazzo floor.

RECOMMENDATIONS:

Remove the existing membrane and Terrazzo where it has disbonded and adjacent questionable areas.

Remove the existing non-conforming underlayment.

Install new underlayment meeting NTMA Guidelines.

Install new membrane, and Terrazzo surfaces.

Further research and analysis should be given to the maintenance and maintenance items being used/applied to these Terrazzo floors. Once a determination has been made for the proper maintenance materials and procedures, the areas of "alligator/bumpy" finish should be fine ground and/or screened to produce the original finish, to be turned over to the owner with recommendations for its future maintenance.

The inspection concluded at approximately 3:30PM.

Wayne T. Grazzini

President

WT Grazzini Terrazzo & Tile, Inc.

for the National Terrazzo & Mosaic Association, Inc.

Terrazzo Inspection Report prepared by Niagara Research Associates

**NIAGARA
RESEARCH
Associates**

Terrazzo inspection report

The Vertical Campus of BARUCH College of CUNY.
25th Street, between Lexington and Third Avenues, New York City

We met at the facility on Thursday, 13 March 2003 at 10:00AM and I spent over 2 hours at the facility to gain as full a perspective as possible of the questionable situation with the terrazzo floors.

The epoxy terrazzo installed circa 2001 by G M Crocetti Corp. of the Bronx;
Jim Anastasi, Gary Markus & Richie Gardner, in attendance.

Also, Tom Spinthourakis of TDX Construction Management Corp.

Commencing in 2001 (reportedly, in accordance with the information furnished to me by Crocetti, well behind the original schedule – but not due to the fault of Crocetti) this installation involves more than 80,000 square feet of TEC's 3/8" nominal thickness Tufflite over flex-epoxy membrane – 3 matrix colors/marble chips patterns were utilized.

The major Issues of Concern:

The scope relates to random audible hollowness; also some obvious disbonding and appurtenant protrusions (primarily along zinc divider strips) along with some surface phenomenon being called "alligatoring or embossing".

Based upon information from both Crocette and TDX representatives, originally none of the "alligatoring" or "peaked edges/corners" type problems were noticed/manifested – or at least reported – until well after the building was turned over to DASNY for occupancy and typical operations began.

The most Significant Questions are:

1. Exactly what is happening and why
2. then, who's likely responsible
3. and finally what are options for remedial(s) ?

We took several digital photos – a legend is attached, with captions and appropriate commentary.

In most cases, the "alligatoring" appears as sublimated epoxy binder compared to surrounding "proud" marble chips – in a few other instances, the chips appear eroded or lower than adjacent epoxy matrix.

We were given a copy of Testwell Laboratories 03/05/03 Investigation report – a few elaborations/clarifications as well as amplifications are:

- the 7 sample probes were removed by others prior to Testwell's survey – the extraction method was merely mentioned as "saw cut" (wet or dry process?) "beyond the failed area", but not noted was the prying up technique or the degree of force so required to dislodge them.
- We were advised that several people noticed odor of solvent when sample pieces were removed – that entrapped moisture or other fluids were also present, but not recorded.
- The samples we saw do not support the (6) observation that "all failures were between the membrane and substrate" – we noted several were debonding of the underlayment from itself and the concrete slab and Testwell's (11) confirms this.
- We agree that fluids are probably intruding the terrazzo along the micro fissures adjacent to the zinc divider strips, thus the high alkali concentration mentioned in Testwell's summary – this "corrosion" could also be part of the "swelling" or peaking.
- The reference to "material shrinkage leading to primary stress" (supposedly meaning the epoxy components) is worthy of much more investigation) – 100% solids epoxy formulations do not "shrink", unless somehow adulterated with either un-reactive plasticizing diluents, which could ultimately migrate, or evaporatives, such as water or a solvent.
- Any significant shrinkage in overlays generally are manifest as cracks or open fissures; the corollary is also true – most commonly expansion as appears in the terrazzo panels as "proud" edges.

Not noted in Testwell report.

Although Crocetti had strongly recommended to Trataros and TDX (and submitted pricing on) the use of MapeCem hydraulic composite or equal composite as retro-underlayment prior to the terrazzo installation, another material was ultimately used.

We understand Crocetti's scope of work reportedly did not require it to furnish nor install the Conflow material and another contractor ultimately did that work.

The reported use of Conflow as "flowable" or generically so called "self leveling" underlayment to obviate variations in the poured concrete slab of many areas – It's thickness ranges from "feather edge" to 1-1/2" or more. What was preparation process? – shotblasting or ?? – was the "re-wettable" primer utilized?

Others than Crocetti would have to answer this as the materials and application were outside their responsibility.

Mfg says max thickness is 1"

Also, we wonder about the material actually provided being composed of a strictly pure Portland cement or possibly blended with another type of "cement" ? (ie: magnesium phosphate or gypsum derivative hybrid, etc ?). This is especially important since we noticed a relatively soft surface (readily scratched with fingernail) and immediately vulnerable to moisture, which turned rather "mushy" within minutes when exposed to very few drops of water and then easily gouged with thumbnail or pocket coin. (ConSpec's literature suggests NOT using this system in continuously wet situations).

In particular, the terrazzo on the suspended stair case landings furnished and installed by Crocetti and are generally intact from a bonding perspective as well as no noticed surface profile erosion. In fact, we do not recall being shown any areas where the terrazzo system has failed when it was applied by Corcetti directly to the structural concrete floor slab where no Conflow or other re-leveling materials were needed.

Henry Allen of TEC/HBF was on site Monday earlier same week – we have no report, but he did finally provide some data about cleaners allegedly being used.

We were advised that an NTMA "official inspection" was being arranged for sometime in the near future.

Substantial discussion took place regarding an additional test program of 3 or 4 cores to be taken (we suggested the dry process).

- wherever suspect "conflow" (or possibly other "equal"?) was used
- where reasonably certain "conflow" was not used, the terrazzo system overlay seems OK
- intersection of zinc divider strips
- area of obvious alligating – primarily along zinc strips

(Tom Spinthourakis of TDX implied that he presently has only a limited budget of maybe \$3000 or so for additional testing)

Specific properties of major interest in evaluating the cores:

- verify compressive strength the underlayment
- adhesion of terrazzo to membrane and in turn to applicable substrata
- bond strength of "conflow" to concrete and interlaminary adhesion
- check "conflow" for moisture resistance

We anecdotally understand there have been rhetorical questions about the possible use of ConSpec #21 as a curing/hardener, which obviously needs to be addressed and resolved, one way or another.

The traditional post application approach to "re-bond" a intermittently loose or marginally adhered concrete or terrazzo overlay, utilizing standard epoxy injection techniques has apparently not been significantly effective in this case.

Unfortunately, as remedial undertaking, we see little alternative to the ultimate removal of the existing terrazzo along with any suspect underlying layer(s) of Conflow down to the structural slab.

Then the replacement with appropriate re-leveling "screed bed" trowel matrix of either epoxy and aggregate mortar (by far the most preferable) or at least polyacrylate latex fortified Portland cement composite, along with the "hydraulic composite" as suggested by Crocetti, whichever is approved/warranted by the selected terrazzo epoxy matrix supplier.

See NTMA Tech Bulletin #99 regarding Ardex/GypCrete – the same holds true of any kindred products, copy attached. The assured compatibility in writing by the manufacturers of each phase is critical.

Finally, the re-installation of the compatible flex-epoxy membrane along with the appropriate zinc divider strips and ultimately the comparable epoxy/marble chips terrazzo topping, including the same degree of grinding/finishing.

Incidentally, since our visit, it has been reported to us that the 14th floor, which we didn't see during our visit also has the epoxy terrazzo system applied directly to the concrete, we're now advised manifests none of the problems indicated above or in Testwell's report (same with the corridor running easterly from the present construction related functions offices).

We also now understand that three cores were very recently taken as noted above – as yet, we have no information about the further testing of them.

We appreciate the opportunity to be of unbiased professional service and stand ready to assist with further information as may be requested.

WJF

Fritz Iselin, Director
NIAGARA RESEARCH
4041 Alesbury Dr.
Jacksonville, FL
32224

(904)992-8886 or 8180
www.FritzIselin.com

**May 13, 2003 Correspondence From Terrazzo System Supplier Regarding Floor
Leveling Material**



SPECIALTY PRODUCTS, INC.
315 South Hicks Road
Palatine, Illinois 60067-6972
847-358-9500
847-358-9510 FAX

an H. B. Fuller company

Exhibit 'm'

5/13/03

Mr. Scott MacLaren
TDX Construction
152 E. 26th St
New York, NY 10010

fax 646-312-1511

RE: Fill below Tuff-Lite Epoxy Terrazzo

Dear Mr. MacLaren,

Thank you for your interest in Tuff-Lite Epoxy Terrazzo by TEC Specialty Products.

There are often situations where a concrete slab is out of tolerance or requires a change in pitch. We agree with the recommendation of the National Terrazzo and Mosaic Association that fill below an Epoxy Terrazzo topping should be an epoxy/silica sand mortar.

The following products from TEC Specialty Products are appropriate for this application; BC-204, BC-205, BC-212 and BC-226. These are all 100% solids epoxy resin/hardener systems.

If you have any questions or if we can be of service in any way please call us.

Mike L Cichorski
Technical Services Specialist

Material used does not satisfy
this requirement (Conflow)

RECEIVED

MAY 13 2003

TDX CONSTRUCTION

1/1

Manufacturers Literature for Floor Leveling Compound (Conflow)

T E C H N I C A L D A T A

2nd CONTRACT # 16
 PROS CONSTRUCTION, INC.
 SELF LEVELING UNDERLAYMENT
 # 03551-0001-01 Self-finishing and Leveling Composition
 4/5/00

RECEIVED

APR - 7 2000

TDX CONSTRUCTION

(FOR FLOOR LEVELING CHANGE ORDER)

Description

Conflow is a self-leveling and self-finishing polymer modified Portland Cement based material. Use Conflow as an underlayment for interior applications.

2. Areas with heavy or loose cutback must be removed.
3. Shot blasting is recommended.
4. Use Conspec Orange Peel to remove any residual cutback.

Title and Technical Specification

Exhibit 'E'

RECEIVED

APR 14 2000

TDX CONSTRUCTION

BARUCH ACADEMIC COMPLEX 65 LEXINGTON AVENUE NEW YORK, N.Y.		
<input checked="" type="checkbox"/>	A ACTION	APPROVED
<input type="checkbox"/>	B ACTION	APPROVED AS NOTED Resubmit for Record Purposes Only
<input type="checkbox"/>	C ACTION	REVISE AND RESUBMIT
<input type="checkbox"/>	D ACTION	REJECTED
<p>Reviewing is only for conformance with the design concept of the project and compliance with the information given in the contract documents. The contractor is responsible for dimensions to be confirmed and correlated at the site, for information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction, and for coordination of the work of all trades.</p> <p>KOHN PEDERSEN FOX ASSOCIATES P.C. Date 4-13-00 By <i>ML</i></p>		
03551 SECTION	01 FILE NO.	01 SUBMISSION

use of conflow approved
 by KPF

It
 us
 the
 in
 ipment and
 to continuously

various types of pumps
 available for the application of
 with your local representative
 availability and recommenda-

ackaging

45 lb. triple lined bag (20.4 kg)

Limitations/Precautions

DO NOT place at temperatures below 50°F (10°C) or if the temperature is expected to fall below 50°F (10°C) in the next twenty-four hour period. Severe variation of 1" (2.54 cm) or more over 1' (.30 m) or less should be referred to manufacturer for proper procedure. Wind over 5 m.p.h. can dehydrate Conflow and cause cracking. Unless area of application can be

24 hours
 to traffic. If the
 needs 48 hours or there

Receiving

All bagged products should be checked for dryness prior to signing shipping papers.

Storage

Conflow should be stored in a cool, dry interior area. At no time should material be exposed to high moisture, rain or snow conditions.

Fax-On-Demand

Request Document 1000 for a complete Index of Conspec Product Information. For Conflow documents request 1525 for Literature and 1526 for the MSDS.



Fax-On-Demand

060109E



CONSPEC

EXHIBIT 1

T E C H N I C A L D A T A

Conflow

Self-finishing and Leveling Composition

Description

Conflow is a self-leveling and self-finishing polymer modified Portland Cement based material. Use Conflow as an underlayment for interior applications.

Manufacturer

Conspec Marketing & Manufacturing Co., Inc.
636 South 66th Terrace
Kansas City, Kansas 66111
Telephone: (913) 287-1700
(800) 348-7351

Use

For new concrete, old concrete, old concrete with cutback, tile or terrazzo, wood and special shot-blasted surfaces.

Architectural Specifications

Self-leveling Underlayment: All concrete floors to be leveled and/or resurfaced shall be topped with a self-leveling, polymer modified material. Approved product: Conspec Conflow or approved equivalent.

Application

Surface Preparation - Typical for All Surfaces:

1. Floor should be free of oils, waxes, curing compounds, sealers and any foreign material.
2. Clean floor with a mechanical scrubber with a vacuum pickup or shot blasting equipment to remove dust and dirt. DO NOT broom sweep.
3. Use hand metal scrubbers. Mop or wet dry vacuum in small areas where a mechanical scrubber is impractical. NOTE: Refer to specific floor sections below for further instructions.

New and Old Concrete Surfaces:

1. Surface should be hard, dense and non-dusting.
2. Surface should be twenty-eight days or older and free of all curing agents, sealers etc.
3. Patching materials that are loose or unsound should be removed. Refer to "Special Surfaces" for further details.
4. Test the Primeflow* on the prepared surface to insure good adhesion: STEP A. Apply the Primeflow to a 4' by 4' (1.22 m x 1.22 m) area with a broom or mop and allow it to dry. STEP B. Using the pointed end of a knife or a sharp device, scrape through the Primeflow. If the Primeflow can be peeled up, it is not a suitable

application. If the scraper only scratches the Primeflow, the surface is suitable for application.

Old Concrete Surfaces With Cutback:

1. Refer to the general procedures for "New and Old Concrete."

2. Areas with heavy or loose cutback must be removed.
3. Shot blasting is recommended.
4. Use Conspec Orange Peel to remove any residual cutback.

Tile and Terrazzo Surfaces:

1. Must be free of all waxes, sealers, oils or grease and any loose or foreign material.
2. The Primeflow test is critical. Refer to the Primeflow instructions in "New and Old Concrete."

APPLICATION PROPERTIES

Working Time (depending on environment).	
Interior	10 - 25 minutes
Setting Time (ASTM C-266)	
Initial	50 - 75 minutes
Final	2 hrs. - 2 hrs., 30 min.
Avg. Compressive Strength, w/m = 0.21 (ASTM C-109)	
1 day	1500 psi min. (10.3 MPa)
7 days	3500 psi min. (24.1 MPa)
28 days	6000 psi min. (41.3 MPa)
Tensile Strength (ASTM C-307)	
1 day	300 psi (2.1 MPa)
7 days	500 psi (3.4 MPa)
Expansion (ASTM C-157)	
1 day	.001%
7 days	.001%
28 days	.002%
Bond Strength (tension)	
7 days exceeds	200 psi (1.4 MPa)
Shear Bond Strength (ASTM C-1042)	
14 days	1054 psi (7.3 MPa)
Coverage of 45 lbs. at 1/4"	22 sq. ft. (2.04 sq. m.)
Water Requirements for 45 lbs. (1 bag)	1.18 to 1.31 gal. (4.5-5 L)
Mixing Time	2 - 3 minutes
Maximum Depth	1" (2.54 cm)



CONSPEC®

2/3

Wood Floors and Wood Floors With Cutback Surfaces:

1. Refer to the general procedures for "New and Old Concrete", steps 1-4.
2. The construction of the floor should be sufficient for the intended loading and use without any flexing or moving.

Because concrete and wood have very different expansion movement characteristics it is recommended that reinforcing such as hardware cloth be used and attached with staples on a minimum of 12" (30.5 cm) centers.

4. Primeflow can be applied before or after the installation of wire.

Wear Surface: Conflow can be used as an interior wearing surface for foot traffic when coated with an appropriate Conspec sealer. Please consult Conspec for specific recommendations for your application.

Shot Blasted or Sanded Surfaces:

1. Refer to the general procedures for "New and Old Concrete," steps 1-4.
2. These surfaces can be very dusty requiring extra care in removing dust.
3. Because these surfaces are more porous, extra Primeflow will be required.
4. A test patch should be applied to determine if surface is properly primed and sealed. Numerous pinholes appearing either during or after placing the primer indicates the floor is not adequately primed and sealed.

Special Surfaces: Special surfaces require special procedures and should be referred to the manufacturer's representative. Special surfaces such as: Gypsum, latex cement, lightweight concrete, ceramic tile and vinyl tile.

Conflow can be extended with clean predampened 3/8" pea gravel for deep application. Please contact Conspec for specific application instructions.

• **Primer Application:** Primeflow, a special adhesive agent made especially for Conflow, is critical to the installation of Conflow. The purpose of Primeflow is to seal the surfaces which otherwise absorb water from the material and do not allow proper hydration or provide a suitable surface for the adhesion of Conflow.

1. The Primeflow comes ready-to-use. Coverage is 100-300 square ft. per gallon (2.5-7.4 m²/L) depending on the porosity of the surface.
2. Apply with a mop or broom. Drying time is 2-3 hours at 75°F (23.9°C) but slightly longer with a decrease in temperatures and slightly less with an increase in temperatures. Primeflow will remain slightly tacky when dry. NOTE: Poor ventilation will delay normal drying time. Fans will help increase circulation to increase drying time.
3. Any Primeflow puddled in low areas should be wiped up.
4. Primed surfaces are good for 24 hours providing it is not subjected to traffic. If the placing of the leveler exceeds 48 hours or there

has been traffic across the floor a re-application of primer is necessary.

5. Very porous surfaces require at least two applications of Primeflow. The first application may be diluted at a ratio of 1:1 with water and the second coat at full strength.

6. It is recommended that in all cases a primer test be performed prior to placing Conflow. Refer to the "New and Old Concrete" instructions.

Material Installation - Hand Equipment Required:

1. 1/2" (1.27 cm) electric drill 6.50 r.p.m.
2. Marked container for measuring water.
3. Mixing container size: minimum 5 gal. pail (18.9 L), a 15 gal. pail (56.7 L) is recommended.
4. Mixing paddle: wire or egg beater type.

Mixing: Place pre-measured water into mixing container. Start drill and add Conflow slowly but DO NOT exceed two to three minutes. Water may be adjusted slightly to produce desired consistency. CAUTION: Excessive water will cause segregation and cracking; reducing compressive strength resulting in bond failure.

Water Requirements:**Interior**

45 lb. Conflow (1 bag) (20.4 kg)
9.5 - 10.5 pints of water (4.5-4.9 L)

Note: The data shown is based on controlled laboratory testing. Reasonable variation from results shown can be expected. Field and laboratory testing should be controlled on the basis of the desired placing consistency, rather than strictly on the water content.

Placing: It is recommended that placing should be in lanes 15' (4.6 m) in width formed using foam tape or other suitable forming material. Place in a continuous operation by pouring back and forth within the width of the formed area. It is important that this be done in a continuous operation to achieve proper merging of the material. DO NOT exceed 2-3 minutes in placing material. Crew sizes, equipment and material should be of such a size to continuously place in 2-3 minutes.

Pumping: There are various types of pumps manufactured and available for the application of Conflow. Consult with your local representative for their names, availability and recommendations.

Packaging

45 lb. triple lined bag (20.4 kg)

Limitations/Precautions

DO NOT place at temperatures below 50°F (10°C) or if the temperature is expected to fall below 50°F (10°C) in the next twenty-four hour period. Severe variation of 1" (2.54 cm) or more over 1' (30 m) or less should be referred to manufacturer for proper procedure. Wind over 5 m.p.h. can dehydrate Conflow and cause cracking. Unless area of application can be

protected from wind, application should be postponed until there are favorable conditions. Temperatures in excess of 80°F (26.7°C), ambient or surface, can cause flash set and dehydration, resulting in cracking and debonding.

Caution: Contains Portland Cement and sand. Cement will cause irritation. Avoid contact. Use of a dust respirator, safety goggles and rubber gloves are recommended. Avoid prolonged contact with clothing. In case of contact with eyes, immediately flush with water for at least 15 minutes. Get prompt medical attention. DO NOT wear contact lenses when working with this product. DO NOT take internally. Keep out of reach of children.

Avoid hazards by following all precautions found in the Material Safety Data Sheet (MSDS), product labels and technical literature. Please read this information prior to using the product.

Warranty

Conspec Marketing & Manufacturing Co., Inc. warrants that at the time and place we make shipment, our materials will be of good quality and will conform with our published specifications in force on the date of acceptance of the order. THE FOREGOING WARRANTY SHALL BE EXCLUSIVE AND IN LIEU OF ANY OTHER WARRANTY, EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ALL OTHER WARRANTIES OTHERWISE ARISING BY OPERATION OF LAW, COURSE OF DEALING, CUSTOM OR TRADE OR OTHERWISE. As the exclusive remedy for breach of this Warranty, we will replace defective materials, provided, however, that the buyer examines the materials when received and promptly notify us in writing of any defect before the materials are used or incorporated into a structure. Twelve (12) months after Conspec Marketing & Manufacturing Co., Inc. has shipped the materials, all our Warranty and other claims with respect to the quality of the materials delivered shall conclusively be presumed to have been satisfied, all liability therefore terminates, and no action for breach of any duties may thereafter commence. Conspec Marketing & Manufacturing Co., Inc. shall in no event be liable for consequential damages. Unless otherwise agreed to in writing, no warranty is made with respect to materials not manufactured by Conspec Marketing & Manufacturing Co., Inc. We cannot warrant or in any way guarantee any particular method of use of application or the performance of materials under any particular condition. Neither this Warranty nor our liability may be extended or amended by our salespeople, distributors or representatives or by any sales information or drawings.

Receiving

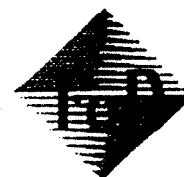
All bagged products should be checked for dryness prior to signing shipping papers.

Storage

Conflow should be stored in a cool, dry interior area. At no time should material be exposed to high moisture, rain or snow conditions.

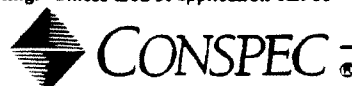
Fax-On-Demand

Request Document 1000 for a complete Index of Conspec Product Information. For Conflow documents request 1525 for Literature and 1526 for the MSDS.



Fax-On-Demand

0601098



CONSPEC

Curing Compound MSDS

MATERIAL SAFETY DATA

The Euclid Chemical Company • Cleveland, Ohio 44110

FOR TRANSPORTATION & SAFETY EMERGENCIES CALL: 1-800-255-3924
INTERNATIONAL USERS CALL COLLECT: 1-813-979-0626

TRADE NAME
Super Diamond Clear
CHEMICAL NAME

1. INGREDIENTS

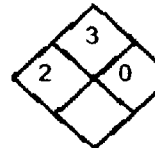
MATERIAL	CAS#	%	ACGIH(TLV)	PEL
Styrene Ethylhexyl Acrylate Copolymer	proprietary	45-50		
*Xylene	1330-20-7	50-55	100 ppm	100 ppm
*Diocetyl Phthalate	117-81-7	0-5	5 mg/m ³	5 mg/m ³
*SARA Title III Section 313 Chemical				

Styrene Acrylate noted as residue under terrazzo in areas where flooring placed directly over concrete

2. PHYSICAL DATA

APPEARANCE Clear Liquid	ODOR Solvent	MELTPOINT NA	SPECIFIC GRAVITY <1
VAPOR DENSITY (AIR=1) 4.1	%VOLATILE BY WEIGHT 75	VOC 661 g/l	BULK DENSITY NA
VAPOR PRESSURE @70°F - 9.5	%SOLUBILITY(H ₂ O) None	EVAPORATION RATE	BOILING POINT 320°F - 335°F
			PH

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT & METHOD 80° - 90°F SETA	NFPA FIRE HAZARDS IDENTIFICATION SYSTEM 
FLAMMABLE LIMITS LEL 1.0% UEL 7.0% by volume in air	
EXTINGUISHING MEDIA NFPA Class B extinguishers(CO ₂ , Dry, Foam)	
SPECIAL FIRE FIGHTING PROCEDURES Use fog nozzles to cool closed containers	
UNUSUAL FIRE AND EXPLOSION HAZARDS Keep containers tightly closed. Isolate from heat, elec. equip., sparks and open flames. Closed containers may explode when exposed to heat.	

4. PHYSIOLOGICAL EFFECTS

LD50 ORAL (INGESTION) Rat=4.7 g/kg	LD50 DERMAL (SKIN CONTACT) Rat=>4 ml/kg	LC50 (INHALATION) Rat=>3670 ppm/8hr
PRIMARY ROUTE OF EXPOSURE Inhalation and splashing		THRESHOLD LIMIT VALUE (TLV) 100 ppm
EFFECTS OF OVEREXPOSURE Inhalation: Vapors may be irritating and may cause CNS effects, vertigo, muscular weakness, narcosis and confusion. Eye: Contact may cause irritation, pain and burns. Skin: Contact may cause eczema, dryness or dermatitis. Ingestion: Unlikely route of exposure. May cause burning sensation in mouth, stomach, nausea, salivation, vomiting, coughing, CNS effects, renal or liver toxicity. Pregnancy: May cross placenta and cause pregnancy disorders. WARNING: This product contains chemicals known to the State of California to cause cancer, birth defects, and/or other reproductive harm.		



THE EUCLID CHEMICAL COMPANY
19218 REDWOOD RD
CLEVELAND, OHIO 44110
1-800-321-7628 OR 216-531-9222

NE - NOT ESTABLISHED
NA - NOT APPLICABLE

5. EMERGENCY AND FIRST AID PROCEDURES

Inhalation: Move to fresh air. Monitor for respiratory distress. Give oxygen if necessary. If cough or difficulty in breathing occurs, immediately seek medical attention.

Eye: Irrigate eye for 15 minutes. If pain, irritation or burning persists, seek medical attention.

Skin: Wash area twice with soap and water. If pain, irritation or burning persists, seek medical attention.

Ingestion: Administer milk or water. DO NOT induce vomiting. Call a Physician or Poison Control Center immediately. DO NOT give anything orally to an unconscious person.

6. U.S. D.O.T. SHIPPING DESCRIPTION

RQ, Flammable Liquid, n.o.s. (Contains Xylene), 3, UN1993, PGIII, Class 55

7. SPECIAL PROTECTION INFORMATION**VENTILATION**

Use with adequate fresh air. Use explosion proof ventilation as required. Other special precautions such as respiratory masks may be required in extreme cases.

RESPIRATORY

NIOSH approved organic vapor cartridge respirator according to 29 CFR 1910.134.

EYE PROTECTION

Yes

PROTECTIVE GLOVES

Yes (rubberized)

OTHER

Protective clothing to prevent skin contact.

All chemicals should be handled so as to prevent eye contact and excessive or repeated skin contact. Appropriate eye and skin protection should be employed. Inhalation of dusts and vapors should be avoided.

8. CHEMICAL REACTIVITY**CONDITIONS CAUSING INSTABILITY**

Temperatures over 120°F.

INCOMPATIBILITY (MATERIALS TO AVOID)

Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide and other organics

SPECIAL SENSITIVITY

NE

9. STORAGE INFORMATION**PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING**

Keep containers tightly sealed in warehouse or on job site.

10. SPILL, LEAK, AND DISPOSAL INFORMATION**STEPS TO BE TAKEN IN CASE MATERIAL IS SPILLED OR RELEASED**

Remove all sources of ignition. Avoid breathing vapors. Ventilate area. Vapors are heavier than air & may accumulate in low spots. Remove with inert absorbent and non-sparking tools.

WASTE DISPOSAL METHOD

Dispose of in accordance with all federal, state, and local laws and regulations.

PREPARED BY

Rich Mikol

DATE

01/20/03

PAGE 2 OF

Super Diamond Clear

TELEPHONE NUMBER

216-531-9222

SUPERSEDES MSDS DATED

12/09/02

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet.

Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

**Epoxy Membrane
Manufacturer's Literature**

BC 258

Exhibit 'G'

TEC
an H.B. Fuller company

P R O D U C T I N F O R M A T I O N

DESCRIPTION/USAGE

EC brand FlexGuard™ Epoxy Membrane (BC-258) is a 100% solids, flexible epoxy designed to bridge hairline cracks in concrete substrates and aid in suppressing reflective cracking in finished epoxy floors. It is recommended for use over interior concrete surfaces prior to the installation of TUFF-LITE® Epoxy Terrazzo Flooring.

KEY PRODUCT BENEFITS

- Bridges cracks up to 1/8 inch (3 mm)
- Zero calculated VOC (Volatile Organic Content)
- Flexible—provides 140-160% elongation.

SUBSTRATE SUITABILITY AND PREPARATION

FlexGuard epoxy membrane is recommended for use over concrete substrates. The concrete floor slab shall have cured a minimum of 28 days, be level to within 1/4 inch in 10 feet (6 mm in 3 m) and have a steel trowel finished surface. No curing agents which could prevent bonding should be used. Floor surface should be prepared either chemically or mechanically to accept epoxy membrane. If concrete slab is on or below grade, there should be an efficient moisture vapor barrier below slab.

Curing compounds should be chemical
constituents noted in areas of failed
terrazzo
 Approximate coverage when mixed by volume ratio of one Part A to one Part B.

MEMBRANE THICKNESS	APPROXIMATE COVERAGE
20 mils	80 sq. ft. per mixed gallon (2 m ² /L)
40 mils	40 sq. ft. per mixed gallon (1 m ² /L)

Coverage rates are approximate and will vary depending upon the condition of the substrate.

INSTALLATION INSTRUCTIONS

MIXING INSTRUCTIONS

Substrate and materials must be maintained at 50°-90°F (10°-32°C) for 24 hours before, during and after application. Into a clean, 5 gallon (18.92 L) pail, pour half the contents of Part A liquid. Add half of the Part B contents and mix thoroughly (approximately 3 minutes) using low speed mixer.

MEMBRANE APPLICATION

FlexGuard Epoxy Membrane can be applied using a roller, brush, or trowel. Apply a smooth, uniform, continuous layer of membrane approximately 20 mils thick. Two coats of 20 mils each are recommended. Allow membrane to cure 16-24 hours at 70°F (20°C) and 50% RH.

LIMITATIONS

Do not use in temperatures below 50°F (10°C). FlexGuard epoxy membrane should not be used where moisture vapor transmission or hydrostatic pressure conditions exist.

TUFF-LITE®
 Epoxy
 Terrazzo
 Systems

FlexGuard™
 Epoxy
 Membrane

GC CONTRACT # 16
 TDX CONSTRUCTION, INC.
 BC-258 FLEX MEMBRANE
 12-09420-0018-01
 SUBJ. # 1417/00

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OCT 23 2000

TDX CONSTRUCTION

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TECHNICAL DATA

FlexGuard™ Epoxy Membrane (BC-258)	
Use Performance	Typical Results
Solids	100%
Adhesion	300 psi (100% concrete failure)
Hardness (ASTM D-2240, Shore D)	20-25
24 hours	40-42
7 days	
Tensile Strength (ASTM D-638)	1550 psi [73°F (23°C), 50% RH]
Elongation (ASTM D-638)	140-160% [73°F (23°C), 50% RH]
Flammability	Self-extinguishing over concrete
Physical Properties	
Mix Ratio (A:B) by volume	1:1
Color	Gray
VOC (g/L) of material calculated [72°F (22°C)]	0
Cure Time [10 mils @70°F (21°C), 50% RH]	7-8 hours, dry to touch 12-24 hours to recoat
Storage	Store in cool, dry location, out of direct sunlight, kept at temperatures of 50°-90°F (10°-32°C).
Shelf Life	Maximum of 1 year from date of manufacture in unopened containers.

PRECAUTIONS

Read complete cautionary information printed on product container prior to use.

FOR MEDICAL EMERGENCY INFORMATION,
CALL 1-800-228-5635,
EXT. 018.

WARRANTY

TEC Incorporated offers a One Year Limited Material Warranty on TUFF-LITE™ Epoxy Terrazzo products when installed in accordance with TEC's printed specifications. FOR FURTHER INFORMATION ON TEC WARRANTIES AND REMEDIES, CONSULT TEC INCORPORATED AT 1-800-323-7407.

This Product Information Sheet has been prepared in good faith on the basis of information available to TEC at the time of publication. It is intended to provide users with information about and guidelines for the proper use and application of the covered TEC product(s) under normal environmental and working conditions. Because each project is different, TEC cannot be responsible for the consequences of variations in such conditions, or for conditions not foreseen by TEC.

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TEC
an H.B. Fuller company

TEC INCORPORATED
Building Products Group
315 South Hicks Road
Palatine, Illinois 60067

800-323-7407
847-358-9500
800-952-2368 FAX

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cell # 1-847-226-1439



PRODUCT INFORMATION

DESCRIPTION/USAGE

Tuff-Lite® 5 is a poured-in-place epoxy terrazzo flooring system that combines a two-part resin matrix with rich colored marble, granite, glass or other aggregate. The finished floor surface is long-lasting, chemical resistant, easy to clean and virtually odor-free.

Tuff-Lite 5 (BC-205) is 100% epoxy resin solids that is mixed 5 Parts A to 1 Part B by volume.

SUBSTRATE SUITABILITY AND PREPARATION

Tuff-Lite 5 epoxy flooring is recommended for use over concrete substrates. The concrete floor slab shall have cured a minimum of 28 days, be level to within 1/4 inch in 10 feet and have a steel trowel finished surface. No curing agents which could prevent bonding should be used. Floor surfaces should be prepared either chemically or mechanically to accept an epoxy topping.

COVERAGE

Per blended gallon of Tuff-Lite 5 (5 Parts A and 1 Part B):

THICKNESS	CHIP SIZES	RESIN COVERAGE
1/4" terrazzo floor	#1 and #0	12-15 sq. ft./gallon
3/8" terrazzo floor	#2 and #1	8-11 sq. ft./gallon

INSTALLATION INSTRUCTIONS

MIXING

All materials and equipment used in mixing Tuff-Lite 5 epoxy terrazzo matrix must be clean and dry. Always mix Tuff-Lite 5 in a ratio of 5 Parts A to 1 Part B. Stir Tuff-Lite 5 Part A prior to use to promote color uniformity. Add Part B into Part A and mix with a low speed electric drill (350 rpm) equipped with mixing paddle or in a mortar mixer. Mix for 3 minutes. Continue mixing the epoxy resin while adding pre-blended chips. Blend chips with epoxy for an additional 3 minutes. The epoxy and aggregate mix is then ready to be spread on the floor.

SPREADING EPOXY MATRIX

The epoxy matrix and aggregate mix is spread on the concrete floor and leveled to a specified thickness with a trowel, rake, lute or screed. Trowel the mix to compact the chips and produce a level surface that appears smooth and filled without voids or bubbles.

CURING

Maintain the temperature of the floor at 50°F or higher during cure. Allow floor to cure for at least 12-24 hours before grinding. Higher temperatures will speed cure of system. Lower temperatures may require the floor to cure more than 24 hours before grinding.

GRINDING

Grind the floor with conventional terrazzo grinding equipment and techniques. Care must be taken and progress examined frequently to prevent grinding through thin terrazzo. Rough grind the floor using 24 or 40 grit stones. Sand may be used to speed cutting and keep stones clean; however, use care since scratches are difficult to remove. If sand is used in rough grinding it must be

TUFF-LITE®
Epoxy
Terrazzo
Systems

Tuff-Lite® 5
Epoxy Terrazzo
Flooring

EXHIBIT 'G'

CONTRACT # 16
CONSTRUCTION, INC.
BC-205 EPOXY MATRIX
16-07420-0019-01
SUB. # 10/19/00

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completely removed. Follow the rough grind with a 80 grit stone to polish out scratches. Finish grind the floor using 120 grit stones or finer. Make sure all scratches removed. Clean all grinding residue using large amounts of water to flush dust and grinding residue from floor. Remove grinding residue with vacuum and dispose in accordance with local regulations. Mop up standing water.

GROUTING

Make sure floor is clean and dry. Dry mop prior to grouting. Mix a small amount of Tuff-Lite® 5 epoxy resin (5 Parts A to 1 Part B) in a clean gallon container. Mix thoroughly with an electric drill and paddle for 3 minutes. Apply resin with flat-edged steel trowel (100-200 sq. ft. per quart) working back and forth to fill pin holes and voids. Leave excess grout on floor and allow to stand 15 to 20 minutes. Then remove excess grout with trowel. Dust floor with silica flour or marble dust and rub into wet grout. Re-dust with silica flour or marble dust to excess. Allow grout to cure overnight.

POLISHING AND FINISHING

After grout has cured (for best results, let cure for a minimum of two days), remove the excess grout with a terrazzo grinder and 120 grit stones. Add soap to grinding water. When grout has been removed, use clean (no soap) water and clean up floor. Note: Floor may be sealed to highlight chips and enhance polish. Use conventional techniques with non-slip, thin film terrazzo sealers in accordance with manufacturer's instructions.

LIMITATIONS

Not to be used where moisture vapor transmission or hydrostatic pressure conditions exist.

TECHNICAL DATA

Performance of Epoxy System with Aggregate: Tuff-Lite 5 epoxy matrix mixed according to TEC recommendations and blended with 3 volumes of Georgia White marble blended 60% #1 chip and 40% #0 chip. All specimens were cured 7 days at 75°F ± 2°F and 50% ± 2% relative humidity.

Test Method	NTMA Requirement	Typical Results
ASTM D-635 Flammability	Self-extinguishing, extent of burning: 0.25 inch maximum	Pass
ASTM D-696 Thermal Coefficient of Linear Expansion. Temperature Range: -12°F to 140°F	25 x 10 ⁻⁶ inches per inch per °F maximum	Pass

Performance of Epoxy Resin: Tuff-Lite 5 epoxy resin mixed according to TEC recommendations and tested without aggregate added. All specimens were cured for 7 days at 75°F ± 2°F and 50% ± 2% relative humidity.

Test Method	NTMA Requirement	Typical Results
ASTM D-2240 Hardness using Shore D Durometer	Value between 60-85	82
ASTM D-638 Tensile Strength at rate of 0.2 inch/minute. Specimen made using "C" die listed in ASTM D-412.	3,000 psi minimum	3,910 psi
ASTM D-695 Compression Strength Specimen B Cylinder.	10,000 psi minimum	17,295 psi
ASTM D-1308 Chemical Resistance 7 day exposure at room temperature by immersion method.	No deleterious effects when exposed to: Distilled Water 0.25% Detergent Solution Mineral Oil 1% Soap Solution Isopropanol 10% Sodium Hydroxide Ethanol 10% Hydrochloric Acid 5% Acetic Acid 30% Sulfuric Acid	No deleterious effects

PRECAUTIONS

Read complete cautionary information printed on product container prior to use.

FOR MEDICAL EMERGENCY INFORMATION,

CALL 1-888-853-1758.

WARRANTY

TEC Specialty Products, Inc. offers a One Year Limited Material Warranty on TUFF-LITE® Epoxy Terrazzo products when installed in accordance with TEC's printed specifications. FOR FURTHER INFORMATION ON TEC WARRANTIES AND REMEDIES, CONSULT TEC SPECIALTY PRODUCTS INC. AT 1-800-323-7407.

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Concrete Specifications Information

Exhibit 'H'

Baruch Academic Complex
Baruch College - Site B
New York, NY
03301-10

H. Welded Wire Fabric: ASTM A185, size shown on Drawings.

I. Non-Shrink Grout

1. The non-shrink grout shall be "Euco NS" by The Euclid Chemical Co., or "Masterflow 713" by Mater Builders. The factory pre-mixed grout shall conform to ASTM C1107, "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)".

J. Clear Curing and Sealing Compound (VOC compliant): The compound shall have 30% solids content minimum, and will not yellow under ultra violet light after 500 hours of test in accordance with ASTM C4587 and will have test data from an independent testing laboratory indicating a maximum moisture loss of 0.039 grams per sq. cm. when applied at a coverage rate of 300 sq.ft. per gallon. Product shall be "Super Diamond Clear VOC" by the Euclid Chemical Co. or approved equal. Use this curing agent for all slabs to remain exposed, or to receive mastic adhesive for floor finish.

K. Premolded Joint Filler Strips: ASTM D1752.

L. Formwork

1. For unexposed surfaces and rough work, use Exterior Type Douglas Fir, Grade B-B, (Concrete Form) Plywood, conforming to NBS PS-1, minimum 3/4 in. thick, or undressed lumber, No. 2 common or better. Before reusing forms, withdraw nails and thoroughly clean surfaces to be in contact with concrete.
2. For exposed surfaces not otherwise specified use Special exterior Type Douglas Fir, Grade A-B plywood, conforming to NBS PS-1, minimum 3/4 in. thick and constructed so that finished concrete will be straight, smooth, dense, free from honeycombs, bulges, or depressions. Keep joints between plywood sections to a minimum and make tight and strongly backed so that adjoining edges remain flush and true. Unsightly joint marks will not be permitted.

M. Form Ties: For securing forms where surfaces will be exposed in the finished work, use tie screws with removable plastic cones, removable bolts, special removable tie wires or Series 300 stainless steel snap ties. For all other forms, use either bolts or wires. Use ties of such type that when forms are removed, no metal is closer than 1-1/2 in. from the finished concrete surface.

N. Form release agents: Commercial for Malaysian form release agent compounds that will not bond with, stain or adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces.

1. Submit certification that the form release agent is compatible with admixtures and applied finishes.

O. Vapor Barrier: Polyethylene sheeting six (6) mils thick, of approved manufacturer.

P. Styrofoam: By Dow Chemical or approved equal per ASTM D1621.

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Terrazzo Flooring System Specification Information

Exhibit 'I'Epoxy Terrazzo
Page 09420-7

2.04 PRECAST TERRAZZO

- A. Shop fabricate in strict accordance with the submitted and reviewed submittals, in an accurate and uniform manner.
1. The essence of this work is that it shall match the cast-in-place work in every respect, with regards to chips, matrix, color, appearance, finish and character.
 2. Precast terrazzo items shall be cast in forms to profiles and sizes noted. The material shall be vibrated or otherwise compacted to an assured maximum density and shall be properly cured. After curing, it shall have all exposed surfaces ground and polished as specified for cast-in-place terrazzo. Color of precast terrazzo to match the floor exactly.
 3. The precast bases shall be manufactured in regular lengths and with precast inside and outside corner components.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Study the Contract drawings and specifications with regard to the work as shown and required under this Section so as to insure its completeness.
- B. Examine surfaces and conditions to which this work is to be attached and notify the Architect if conditions or surfaces exist which are detrimental to the proper and expeditious installation of the work. Starting on the work shall imply acceptance of the surfaces and conditions to perform the work as specified.
- C. Verify dimensions taken at the job site affecting the work. Bring field dimensions which are at variance, to the attention of the Architect. Obtain decision regarding corrective measures before the start of installation.
- D. Cooperate in the coordination and scheduling of the work of this Section with the work of other Sections so as not to delay job progress.

3.02 WORKMANSHIP AND PREPARATION

- A. Prior to the start of the work examine the concrete substrates to assure that they are whole and intact. Penetrations through the slabs shall be in their proper locations, secure and at the right elevations. The concrete shall not vary more than 1/8" in 10 feet from a true plane.
- B. Only competent workers, experienced in the various branches of terrazzo work, shall be employed for the work of this Section.
- C. Furnish complete instructions relating to precautions or special handling for materials in order to comply with the Occupational Safety and Health Act and provide certification attesting that materials meet all the requirements of the Occupational Safety and Health Act.
- D. Do not execute terrazzo work until the concrete base has been thoroughly cleaned and brought to proper levels and lines and until the work of other trades have been installed, so as not to be damaged by, or interfere with, the installation of the terrazzo.

Also see note next page

EXHIBIT 1

1. Prepare substrates in accordance with recommendations of manufacturer of setting materials.

2. Slab Preparation

- a. Vacuum blast slab to completely remove curing compounds and other substances that would interfere with proper bond of epoxy terrazzo.

- b. Clean area to receive terrazzo of loose chips and foreign matter.

- c. Fill cracks in slab with epoxy resin and fiberglass tape, as recommended by system manufacturer.

- E. Install the crack suppression flexible membrane onto the properly prepared slab in a manner recommended by the manufacturer.

1. ~~Cracks and control joints greater than 1/16 inch~~ *All cracks and control joints* shall be routed and filled with the membrane and shall be overlaid with a 6 inch wide x 25 mil band of the membrane into which shall be embedded a fiberglass scrim cloth. Allow to cure prior to proceeding with the floor application. (Add. #2)

3.03 INSTALLATION

- A. Execute installation using skilled workers authorized by the manufacturer, and working in conformance with the shop drawings and samples. Start of work shall imply acceptance of surfaces to install the epoxy terrazzo.
- B. Install divider strips on the concrete sub-floor and trowel firmly along the edges to assure positive anchorages. Install control joints trips where noted on the reviewed submittals.
- C. Prior to placing the epoxy terrazzo prime the concrete subfloor in accordance with the manufacturer's instructions.
- D. Apply the epoxy terrazzo matrix, filler and chips in accordance with the manufacturer's instructions, to a total of 3/8 inch thickness.
- E. Immediately after the topping is placed, and as soon as the surface will bear weight, apply a liberal coating of the curing material using a lambswool applicator according to the instructions of the manufacturer. Apply to all areas thoroughly. Cure until topping develops sufficient strength to prevent lifting or pulling of terrazzo chips during grinding.
- F. Finishing
 1. Do not grind terrazzo floors until they have developed sufficient strength to prevent chips from pulling out.
 2. Grind with 24 or finer grit stones or with comparable diamond plates. Follow initial grind with 80 or finer grit stones, at interior locations only. Work shall be ground so as to produce a non-slip surface.
 3. After grinding, thoroughly wash the surface with water and clean residue from holes and recesses. Remove excess water with a vacuum or squeegee, and machine or hand apply to fill all voids.